

COST *and* MANAGEMENT

THE OFFICIAL JOURNAL OF

THE CANADIAN SOCIETY OF
COST ACCOUNTANTS & INDUSTRIAL ENGINEERS

INCORPORATED 1920

HEADQUARTERS, 50 HARBOUR STREET, TORONTO

W. A. McKague, General Secretary

Telephone Waverley 4110

Vol. 12

APRIL, 1937

No. 4

• • CONTENTS • •

FUNDAMENTAL PRINCIPLES OF FINDING AND CONTROLLING JOB COSTS. Vidar Hallberg	98
TERMINAL COST ACCOUNTS FOR LOCAL AUTHORITIES....	112
COST ACCOUNTING SYSTEM FOR A JOURNAL BEARING FOUNDRY. J. E. Beauvais	119
CHAPTER NOTES	127
REFERENCE LITERATURE	128

Subscription price to non-members, \$5 a year. Single copies 50 cents.
Members desiring 5 copies or more of a single issue may obtain them
at 25 cents each.

Fundamental Principles of Finding and Controlling Job Costs

By VIDAR HALLBERG, Montreal

(A thesis submitted in connection with the examinations of The Canadian Society of Cost Accountants and Industrial Engineers.)

NOT many years ago manufacturers in this country did not know what their manufacturing cost was and did not think it necessary to find out. Their bank book told them if they were making a profit and that was all they cared about. Such a policy might have been all right in those times when plants were small and competition negligible, but with the rapid growth of industry in the past 25 years and the growing complication of processes came the realization of the necessity of establishing some kind of a system whereby manufacturing cost could be determined accurately and also whereby same could be controlled and kept at a minimum.

To-day, commerce and industry are highly specialized and immense sums of money are invested in separate enterprises. Competition has reached the point in some lines, where success is determined, not upon the liberal margin between the cost of production and the selling price, but upon the ability to turn over capital faster than the other fellow, the price being largely standardized by the law of supply and demand and the profit on each single article of manufacture and sale being comparatively small. It is therefore clear that the man who does not know cost must drift along on an ever-narrowing margin of safety and eventually be eliminated. On the other hand the manufacturer who knows what the margin is between cost and selling price of each product of his plant may control his business and make a sure and steady advance.

Why depend upon periodical book balances to ascertain whether the business is being operated at a profit? Why be content to know simply that the operation of the business as a whole is profitable? The balance shown by the profit and loss account at the end of an accounting period is a composite picture of the profits and losses on all of the orders which have passed through the plant during that time. The business of the year has not consisted of one large order on which a net profit or loss has been made, but of a great many orders each of which has had its own history and has made its contribution toward success or failure.

FUNDAMENTAL PRINCIPLES OF JOB COSTS

As a matter of fact, the cost of each order has been composed of separate cost elements. Unless we have certain knowledge of these elements of cost, how can we hope to control our total cost?

Many people still seem to believe that a cost system is an expensive luxury, but in those cases the blame is to be put on the accountant who installed the system, for not trying to suit his system to the particular requirements of the industry. An efficient analytical cost system, suited to the conditions, will return the cost of its operation many times over in a year by pointing out excessive and needless expenditures.

Before deciding what kind of a cost system to adopt, the manufacturer should first determine what he wants the cost system to do for him and then lay plans to bring about these results.

Generally, any cost system should be an insurer of profits by accurately indicating the line under which selling prices cannot be set. It should also furnish an automatic control of all activities in the business, which control is brought about by predetermined standards, with which actual results can be compared. The cost system should not be complex and should pay for itself many times over and, last but not least, it should tie up with the general accounting system, so that the financial statements will reflect all conditions of the business accurately.

The first step in determining cost is to analyze it in its component parts and draw definite lines between 1. Divisional Cost, 2. Elements of Cost, 3. Direct and Indirect Costs, 4. Departmental Costs, 5. Actual and Standard Costs.

With Divisional Costs is meant the cost incurred in the Manufacturing, Selling and Administrative Divisions of the plant respectively. Of these, Manufacturing Cost, is what we usually refer to, when we use the term "Cost".

Into the manufacturing cost enter three distinct elements:—Material, Labour and Manufacturing Expense.

According to the manner by which these elements can be charged to the product, they are called either Direct or Indirect.

One of the most important prerequisites to correct cost finding is the classification of Departments. It is not only necessary to draw a clear line between Service and Producing Departments but also between the different departments of each group. In speaking of departments in cost finding we mean, not necessarily geographical divisions of manufacturing space, but departments in the sense of distinct processes or classes of operation. With Producing Departments are meant those, which are engaged directly in the manufacturing of the product, and with Service Departments are meant these, which are not

COST AND MANAGEMENT

directly engaged in manufacturing, such as Power Plant, Maintenance, Purchasing, Receiving and Stores Departments.

In order to secure proper control over expenses, the cost of operating each department must be known. In the case of Direct charges no difficulty arises, but when it comes to Indirect charges, these must be carefully analyzed and charged to the different departments according to the benefit derived by each.

The ultimate goal of all cost accounting is to arrive at the unit cost of product, and for this purpose all cost must finally be collected in the producing departments. Service department expenses must therefore be apportioned over these, consideration given to the amount of service rendered. All costs being allocated in the producing departments, the final unit cost can be arrived at by simply dividing the total cost over a given period with the total amounts of units produced during that time.

As mentioned above, there are three elements entering into the cost to manufacture.

Direct Material

Before discussing the cost of Direct Material it is necessary to determine what we mean, when we use this term. We may say that it consists of all material found in the finished product, which can be charged direct to an order or process. This excludes all factory supplies and other indirect materials, which have to be included in manufacturing expense; and waste, which is a cost element in itself and demands the most careful consideration both for definite cost knowledge and conservation of materials. If we are to know how much to charge into the cost of materials, we must know how much material has actually been used.

There are two methods of pricing materials generally in use. The first method is to price it at actual cost. This is possible only where such records are maintained as will identify each lot of purchases from the time it is received until it leaves the plant in the finished product. Looking from the standpoint of the purchaser of finished product it is illogical to price the raw materials in such product at actual purchase prices, because of the fluctuations in the market between the time of purchase and the time of sale and the wide differences in ages of the stocks of competing manufacturers. The second method—that of using current market prices—is the only one recognized by the customer in a declining market in making his purchases and should be followed by the manufacturer in a rising market. "Current costs make the market."

In determining the price at which to charge material into cost, freight, express, etc. on same, should be included as a part of the material cost and not charged to expense.

FUNDAMENTAL PRINCIPLES OF JOB COSTS

Direct Labor

Labor is classified in Direct and Indirect. The former includes all labor which can be charged direct to an order or operation in difference to the latter which has to be distributed on a more or less arbitrary basis. Under the latter group come such functions as trucking, oiling, supervising etc. In the case of Direct Labor both time and money expended on operations can be easily kept track of by means of individual labor reports (Form 1). Each workman is requested to put down starting and stopping time on each order or operation and these reports are sent daily to the cost department, where they are extended. Any "idle time" is kept account of and charged to a special expense account.

Manufacturing Expense

The factor of expense is the most troublesome to deal with. The identification of the expenditures which should come under this heading may be arrived at by the process of elimination. We have determined above what items should be classified as Direct Material and what constitutes Direct Labor. It is therefore evident that, as total cost is composed of the three factors of Direct Material, Direct Labor and Manufacturing Expense, all Manufacturing expenditures which do not fall under the first two headings must of necessity be classed as expense items.

The manufacturing expense consists of three elements:—Indirect Material, Indirect Labor and Expense, which latter includes all expenditures for the general benefit of the plant as a whole or part thereof. There are certain expense items which closely parallel operations, and others which are practically constant or fixed. It is possible to group all expenses under two headings:—"Fixed" and "Variable." These will vary somewhat with different industries, and each must make its own analysis, but, in general, they may be divided as follows:—

Fixed Expenses

Rent, Taxes, Building Depreciation, Building Repairs, Factory Insurance, Heat and Light.

Variable Expenses

Equipment Depreciation, Repairs of Equipment, Purchased Power, Water and Light, Fuel, Factory Supplies, Welfare, etc.

In contrast to the other two cost elements, manufacturing expense cannot be charged to the order or product as it is incurred, but has to be pre-determined. Most manufacturers make a differentiation in the rates at which different expense items are charged to departments. These rates must naturally be based upon past experience plus an intelligent estimate of the possibilities of the year. As expense accrues with the passage of time, it is logical that any

COST AND MANAGEMENT

Form 1

JOB TIME REPORT

Workman Order
Number..... Date..... Number.....
Workman
Description of Job
.....
Time
Started
Time
Stopped.....
Time
Worked.....@..... Per Hour. Cost.....
O.K. Foreman

method for the distribution of the cost of expense should have time as its basis. As we already know the amount of man-hours used, through the labor reports, a rate per man-hour should be established. This could be done by dividing the budgeted departmental expense for the year by the budgeted number of departmental labor-hours.

Standard Costs

The whole scheme of a "Standard Cost System" lies in determining normal standards of cost elements and providing the means for current comparison with actual performance. Any manufacturer who has tried to determine costs by accounting methods will bear testimony to the little value that can be placed on such records, either as giving the accurate cost of the particular job or as forming a basis for pricing future output. Days or perhaps weeks will pass before complete cost figures are available, and the records are then so cold that it is generally impossible to check up comparisons and locate the cause for any apparent inconsistencies. There is not much satisfaction in knowing what a product has cost, if the figures are not useable as an index to future costs. The foundation of any standard cost system lies in carefully prepared standards of material, labor and

FUNDAMENTAL PRINCIPLES OF JOB COSTS

expense, determined by an experienced engineer. There is a tendency on the part of those inexperienced to make use of averages to too great an extent and this defeats the plan for correct elementary standards. The engineering department must make an analytical study of processes and operations making use of such of the exact sciences as will give data on the separation of costs into those elements which vary individually and which form different combinations of costs.

When we speak of "cost standards", we mean amounts which represent normal measures under efficient operation.

The Standards of Material would be found by simply ascertaining the amount of each kind of material required to produce a unit of product. These "quantity standards" could be found in the specification sheet covering the product. These specifications usually also indicate the amount of scrap normally expected. In order to keep control over material prices, "price standards" are set up by the purchasing department, which represent estimates of the market prices for the coming year.

Labor Standards are obtained for both wage rates and hours used. All operations in the plant are graded according to skill or knowledge required, unpleasant or dangerous working conditions, etc. and wage rates are set accordingly. Standard times are arrived at by means of time-studies.

In order to determine Expense Standards each item of manufacturing expense must be treated separately. For those items which vary with the productivity of the plant a "variable budget" must be set, up indicating standard amounts of manufacturing expense at different percentages of capacity of production. The best way to accomplish this is by means of a graphic chart.

A similar chart should be made up for each department in order to control the efficiency of the management of each. Department heads should be made responsible for any variations from standards under their control. These variations are therefore called "efficiency variations." On applying the manufacturing expense to production the pre-determined rate per man-hour is multiplied by the standard amount of man-hours. If the plant should have operated on a level higher or lower than was expected, there will be a variation due to that fact, commonly called "volume variation."

Accounting

To be of any practical value a cost system must be suited to the General Accounting System and not vice versa. It has to tie up with the General Accounts. This is accomplished by use of Controlling Accounts on the General Ledger, which each control a varied amount of Subsidiary Accounts also called the "cost records." The necessity of controlling accounts is due to the vast amount of detail involved in

COST AND MANAGEMENT

Account #

Form 2

STORES LEDGER SHEET

Location

Kind of Material

Size

Minimum Stock Maximum Stock

Received

Issued

Balance

Date	Vo. #	Quantity	Unit Price	Amount	Date	Req. #	Quantity	Unit Price	Amount

FUNDAMENTAL PRINCIPLES OF JOB COSTS

Form 4

JOB COST SHEET

Product..... Order #

For

Posted Finished Goods Ledger.....

Date Started Date Finished Disp.

Posted Sales Ledger

Direct Material

Direct Labour

Dept.....

Dept.....

Item
Date Req. # Cost Cost Date Hours Rate Cost Date Hours Rate Cost

Applied Manufacturing Expense

Dept.....

Dept.....

Dept.....

Summary

Direct Material
Direct Labour
Applied Mfg. Exp.
Factory Cost
Selling Exp.
Adm. Exp.
Cost to Make & Sell
Net Profit
Selling Price

Dept..... Dept..... Total
Act. Std. Act. Std. Act. Std.

COST AND MANAGEMENT

some cost systems which could not be carried on the General Ledger. This is specially true in the case of a Specific Order or Job Cost System which is referred to in the following. This system is used in certain types of plants where the product is manufactured in separate lots of clearly distinguishable quantities either for Stock or Order. Direct costs in this type of industry are charged direct to the product but indirect costs are charged to departments first and from there distributed to the product on the basis of direct labour hours or "man-hours" used.

The Cost Records can be grouped into 5 Subsidiary Ledgers:—
1. Stores Ledger, 2. Finished Parts Ledger, 3. Finished Goods Ledger, 4. Work in Process Ledger, 5. Manufacturing Expense Ledger.

The Stores Ledger, controlled by the Stores Account, consists of a number of Stores Ledger Sheets, one for each kind or size of raw material used (see Form 2). The body of the sheet is divided in three sections. In the Received or Debit Section are entered all materials received as per information contained in costed receiving reports issued by the Purchasing Department. In the Issued or Credit Section are entered all material issued to the factory. These issues should only be made against signed and approved requisitions. By means of a Balance Section the amount of material on hand will always be known, and a cumbersome annual physical inventory is made unnecessary. This balance must always agree with the controlling account to which debits and credits are made from periodical summaries.

The Finished Parts and Finished Goods Ledgers are worked on the same principles as Stores Ledger and are controlled by Finished Parts and Finished Goods Accounts resp. on the General Ledger.

The Work In Process Ledger is controlled either by one single Work In Process Account or by several—one Material In Process, one Labor In Process, one Manufacturing Expense In Process Account for each productive department. The ledger is composed of several "Production Orders" or "Cost Sheets," each covering an order or job. As the illustration (Form 4) shows, there is one section for each element of Cost. In the Material Section is entered all Direct Materials used, whether purchased direct or received on stores requisitions. Note specially that quantities are recorded! In the Labor Section are entered all Direct Labor, not only the cost but also the time used in each department. This time forms the basis for applying the manufacturing expense in the third section. When a job is completed the totals of Material, Labor & Expense are transferred to the Summary beside the Standard amounts pre-determined. The total of all incomplete cost sheets form the Work In Process Inventory, which should agree with the balances on the controlling accounts.

The Manufacturing Expense Ledger is controlled by either one single Manufacturing Expense Account or one Account for each de-

FUNDAMENTAL PRINCIPLES OF JOB COSTS

Form 5

STANDING ORDERS

Department

Date	Code	1001		1002		1003		1004		1005		1006		1007		Apport. Charges 1008
		Req. #	Act. Std.	Req. #	Act. Std.	Req. #	Act. Std.	Req. #	Act. Std.	Req. #	Act. Std.	Req. #	Act. Std.	Req. #	Act. Std.	

Summary Amount

Code # Actual Standard

1001
1002
1003
1004
1005
1006
1007
1008
Total

COST AND MANAGEMENT

partment in the plant and is composed of a number of analysis sheets called "Standing Orders" (Form 5). There is one for each department with columns provided for each kind of expense (usually given a code number). As can be seen by Form 5, there is a special column for "Apportioned Charges." These are the debits resulting from the distribution of service department costs to producing departments. This distribution is made on the basis of service rendered. Different basis is used for different service departments, depending on the class of service they render. Below are a few examples:—

Department	Basis of Distribution
Superintendent's Office	Total number of Labor-hours
Employment and Production Depts.	" " " " "
Purchasing Dept. & Store Room	" " " " "
Engineering Dept.	Hours spent on engineering work
Power Plant—Steam	Amount used
" " —Elec. Power	Horsepowers consumed
" " — " Light	Candle Power
" " —Heat	Area of Radiator Surfaces
" " —Gas	Meter Readings
Maintenance Dept.	Usually distributed direct
Welfare Dept.	Number of employees in each dept.
Building Service Dept.	Floor Space

The distribution should always start with the department which renders service to the greatest amount of other departments.

As for the pure accounting procedure in a plant, where Standard Costs are used, it is advisable to choose a system whereby variations are clearly shown. The best method, through which this purpose is reached, is to debit and credit Work in Process accounts at standard cost and charge any difference between actual and standard values direct to variation accounts which are later transferred to Profit & Loss. All inventories except raw materials are kept at Standards as well as Cost of Goods Sold.

Below are a few examples of Journal Entries. Debits or Credits made at standard values are marked in *italics*. All other entries are at actual cost. A special column is provided for Debits or Credits to Variation Accounts.

FUNDAMENTAL PRINCIPLES OF JOB COSTS

Transaction		Debit		Credit		Debit or Credit Variation a/c
1.	Purchases of Materials for Stores	Stores		Accts. Payable		
2.	Purchases of Dir. Materials for immediate use	Material In Proc.		"		Purchase Var. or Mat. Usage Var.
3.	Purchases of Ind. Materials for immediate use	Mfg. Expense -- Dept. " " A. " " B. " " C.		"		
4.	Materials returned to Vendor	Accts. Payable		Stores		
5.	Payment of Invoice for Purchase	"		Cash		
6.	Dir. Material issued from Stores	Material In Proc.		Stores		Purchase Var. or Mat. Usage Var.
7.	Ind. Material issued from Stores	Mfg. Expense		"		"
8.	Dir. Materials returned to Stores	Stores		Mat. In Proc.		"
9.	Scrap Material placed in Stores	"		"		Scrap Var.
10.	Spoiled Work	Stores Mfg. Expense		Mat. In Proc. Labor In Proc. A. " " B. " " C. Mfg. Exp. In Proc. A. " " B. " " C.		Mat. Usage Var. Labor Cost Var. Mfg. Exp. Var.
11.	Total Wages earned	Labor In Proc. A. " " B. " " C. Mfg. Expense		Accrued Payroll		Labor Cost Var.

COST AND MANAGEMENT

Transaction	Debit	Credit	Debit or Credit Variation a/c
2. Taxes and Insurance		Prepaid Taxes	
		Insurance	
		Reserve for Depr.	
13. Depreciation			
14. Distribution of Mfg. Expense to Service & Productive Departments	Mfg. Expense		
	"		
	Mfg. Exp. Dept. X.		
	" " Y.		
	" " A.		
	" " B.		
	" " C.		
15. Distribution of Service Dept. Expense to a. Mfg. Exp. Dept. Y. Productive Depts.	"	Mfg. Expense	
	" " A.		
	" " B.		
	" " C.		
	b. " " A.	Mfg. Exp. Dept. X.	
	" " B.		
	" " C.		
16. Mfg. Expense Applied to Production	Mfg. Exp. In Proc.	" " Y.	
	" " A.	Appl. Mfg. Exp. Dept. A.	
	" " B.	" " B.	
	" " C.	" " C.	
17. Cost of Fin. Goods Manufactured	Finished Goods		
		Mat. In Proc.	
		Labor. In Proc.	
		" " A.	
		" " B.	
		" " C.	
		Mfg. Exp. In Proc. Dept. A.	
		" " B.	
		" " C.	
18. Sales		Sales	
	a. Accts. Receivable		
	b. Cost of Goods Sold	Finished Goods	
19. Transfer of Appl. Mfg. Exp. to Prod. Dept.	Appl. Mfg. Exp. Dept. A.	Mfg. Exp. Dept. A.	
	" " B.	" " B.	
	" " C.	" " C.	
		Mfg. Exp. Eff. Var.	
		" " Vol.	

FUNDAMENTAL PRINCIPLES OF JOB COSTS

Variance accounts are incorporated in the Profit & Loss Statement as shown in the following illustration:—

Profit & Loss Statement

Sales				xxx,xxx
Cost of Goods Sold				
Standard Cost			xxx,xxx	
Variances				
Material—Purchase		x,xxx		
" — Volume Dept. A.	xxx			
" — " " B.	xxx			
" — " " C.	xxx	xxx		
Labor Cost—Dept. A.	xxx			
" " — " B.	xxx			
" " — " C.	xxx	xxx		
Mfg. Exp.—Efficiency Dept. A.	xxx			
" " — " " B.	xxx			
" " — " " C.	xxx	xxx		
" " — Volume " A.	xxx			
" " — " " B.	xxx			
" " — " " C.	xxx	xxx	x,xxx	
Actual Cost				xxx,xxx
Gross Profit				xx,xxx
Selling & Adm. Expenses				
Standard		xx,xxx		
Variance		x,xxx		
Actual				xx,xxx
Net Profit				xx,xxx

Terminal Cost Accounts for Use by Local Authorities

(From The Accountant Student, January, 1937)

TERMINAL cost accounts as applicable to local authorities do not differ in their construction from those raised by privately-owned undertakings to any material degree so far as basic principles are concerned, but there exist certain aspects which are peculiar to the circumstances and to which due regard must be had in formulating the system.

Local authorities frequently undertake constructional work, e.g. laying down sewers, paving roads, &c., by means of direct labour, and whilst they are anxious to carry out the work in as economical a manner as possible, consistent with good results, they are not, perhaps, so directly concerned with the "profit and loss" aspect as are outside contractors to whom this matter is necessarily of supreme importance.

Although local authorities do not carry on business with a view to profit, the commercial instinct should not be stifled, and all financial systems, costing or otherwise, should be so framed as to stand the test of practical utility.

Another aspect that must not be overlooked is that overhead charges, especially in connection with the costing system itself, are not, perhaps, subject to the same careful scrutiny that would, in other cases, be exercised; with the result that a complicated and costly system may be instituted, tending, by its very intricacies, to defeat its own ends.

In drafting a system of cost accounting and in carrying it into effect, it cannot be too strongly emphasised that the main essentials are simplicity and elasticity, for once the system becomes unduly complicated, delay is experienced in obtaining the required information with the results that particulars cannot be given to the heads of the responsible departments or to committees with due dispatch. It is of little service to be compelled to wait some weeks after the completion of the job for the cost to be revealed.

It must be borne in mind that the cost accounts are a consequence of, and subordinate to, the works being executed and not the reverse; therefore the execution of the works should not be handicapped by the exigencies of the costing system. The system should be so designed that information as to progress can be afforded with the minimum delay to those concerned. This expedition is the more essential where several other jobs of a like nature are in process of execution or are contemplated, and where the council is faced with the problem of "outside contract" versus "direct labour," in the interests of the community.

TERMINAL COST ACCOUNTS FOR LOCAL AUTHORITIES

The System Outlined

In instituting a satisfactory system of terminal costs, one of the main factors necessary to its success is organization of the office machinery upon such lines that the required information is supplied to the costing department. It is desirable that the operation of the system be under the control of the chief financial officer.

The charges to be included fall broadly under two heads, namely, direct and indirect expenditure.

The direct expenditure which may be regarded as the prime cost, would include:—

Materials delivered from store.

Material delivered direct to the job.

Wages.

Cartage.

Incidental charges.

The indirect expenditure will be subdivided so as to afford information for proper charges for works oncost and administration oncost.

Materials from Store

If the costing system is to be efficiently carried out, it is absolutely essential that the receipt and issue of stores be properly controlled and stores accounts instituted.

The stores ledger should be under the control of some officer other than the storekeeper, the link between the two being afforded by a daily return of goods received and issued, made up by the latter officer. This return operates as a journal from which posting to the stores ledger and the cost ledger are effected.

For this purpose the form must be ruled with price and money columns, which should, preferably, not be filled in by the storekeeper but by the stores ledger clerk, either at the time the return is received by him or upon the receipt of the invoices. As the large bulk of the stores would have been bought under contract, there would be little difficulty in inserting the price at once so that the postings could be made without delay. There may be a tendency to be unduly meticulous with regard to the insertion of money values where the exact price is not known, but it is contended that greater utility would be obtained by inserting an approximate price and so getting the records put through much earlier than would otherwise be the case. Stores accounts are of little value if the postings are several days or weeks behind. Any small adjustments necessitated by the adoption of this suggestion would be made in the ledger itself when the invoices are received.

These remarks, of course, only apply to purchases; returned stores would be priced at the exact rate at which they were originally issued.

COST AND MANAGEMENT

Invoices would be dealt with by the stores ledger clerk who would insert the folio of the stores ledger thereon, and would enter in an appropriate column of the ledger account the date the account was passed and his initials, thus reducing to a minimum the risk of an account being passed for payment twice.

This risk can be still further reduced by the adoption of the triplicate order system. The tradesmen must be educated to render their invoices upon the official form attached to the order.

The credit side of the stores ledger would be ruled with columns which could be headed with the description of the particular jobs to which goods have been supplied.

At balancing periods, an abstract of the totals on the stores ledger accounts would be prepared, the totals of the several accounts being agreed as follows:—

The balance brought forward should agree with the balance carried forward from the last account as per the stocktaking list; the purchases should agree with the purchases column of the invoice journal, returns inwards with the particular items shown in the summary of the cost accounts, any old materials being similarly dealt with; labour expended in the preparation of stores for use, e.g. the manufacture of mortar or dressing stone, should agree with the stores column of the wages journal.

The totals of the columns on the credit side of the abstract should agree with the various materials columns in the abstract of the cost ledger accounts. Balances carried forward should, theoretically, agree with the actual stocktaking records, but in practice, of course, this is seldom to be expected, and special columns are usually inserted in the abstract so as to show "overs" and "shorts," the storekeeper being required to explain any large differences that may be revealed. In any case, the stocktaking balances must be those to be carried forward and the net result of the overs and shorts, would be written off and included in the items comprising the works oncost.

An important point arises in connection with the value to be placed upon stores issued. Most municipalities purchase their stores under annual contract and it would therefore be found that the balance of stock brought forward at the commencement of a new accounting period would be based upon a different value from purchases made during that period. The question arises as to whether the practice should be followed of exhausting the stores in hand at the price brought forward before the new price is taken into consideration, whether the stores should be issued at the price current at the time, or whether an average price should be taken. Readers will doubtless be familiar with the arguments advanced by authors of books on cost accounts for or against the several methods indicated.

TERMINAL COST ACCOUNTS FOR LOCAL AUTHORITIES

Materials Delivered Direct to the Job

It is sound policy to order goods for delivery on to the job as far as possible since cartage and handling in the depot are thereby saved. The stores department should only be utilised for the following purposes:—

- (1) In drawing small quantities of goods to complete the job;
- (2) In cases of delay in delivery so as to avoid the work being suspended with consequent loss in labour, &c.;
- (3, For obtaining those goods, e.g. nails, which cannot be easily or economically ordered for direct delivery.
- (4) For storing material, e.g. cement, which requires testing or some other examination before use.

A special ledger should be kept for goods delivered direct, the purchases being dealt with in exactly the same way as in the ordinary stores ledger, a column being provided in the invoice journal to record such transactions and for checking totals. There would naturally be no balance on the ledger accounts, as any goods not required on the job would be returned to store.

Wages

The wages sheets should be so drafted as to allow of detailed allocation of all amounts paid. It need hardly be said that the gross amount of wages should be allocated and not the net amount paid after deduction for health, &c., insurances. The allocations should be transferred to a columnar wages journal, the columns showing the various works on which the men are engaged. In order to avoid too many columns being used, the work executed can be grouped under suitable headings such as highways, sewers, &c., the details of the particular job shown on the weekly allocation sheets from which postings would be made to the cost ledger.

Any wages expended on items dealt with in the stores department should be charged through the stores ledger account, so that the price of issue of that particular commodity can be regulated.

Cartage

It will be necessary to allocate the cartage work undertaken by the executive department so that each job can be charged with its respective proportion. Cartage should be recorded as a direct charge, the allocation being preferably effected on an hourly basis; for if it were not so recorded, but included as an indirect charge, those works which had received their material direct from the contractor would be burdened with an undue proportion of oncost.

The amount at which the cartage should be priced out should be the current rate of hire. This applies, of course, to cases where the authority runs its own stables, the actual cost of which would most probably exceed the cost of outside hire. It would be obviously unfair to charge the job with this extra cost merely because the local

COST AND MANAGEMENT

authority sees fit, for various reasons, to employ horses and carts of its own. Purists might argue that the main purpose of cost accounts is to ascertain the true cost of the work performed, but as the actual cost of running the cartage department could only be ascertained from time to time over a period, any interim charges based on such cost could only be by way of estimate, and the adoption of the course suggested would also have the important effect of enabling the responsible officer and his committee to see whether or no the cartage department is being conducted on competitive and economical lines.

If the costing is to be of any value as a basis of comparison with what would be charged by outside contractors, the records should be compiled as far as possible upon the same standards of value.

Incidental Charges

There are numerous charges of an incidental nature for which provision must be made. These would include accounts for the supply of water, plumbers' accounts for repairs to services, accounts for sub-contracts, &c. A special column should be provided for these in the cost accounts and the posting made from the general ledger account by journal entry or by means of a column provided in the invoice journal itself.

Oncost

The debits to the cost accounts relating to the direct charges can be made with accuracy, but the indirect charges are more or less a matter of estimate, particularly in the case of local authorities where the work carried out is not of a uniform nature, and a considerable amount of the expenditure involved is not adaptable for treatment in the direction of cost accounts. For instance, the finance department has a multiplicity of duties to perform and the proportion of expense to be charged as oncost in respect of work forming the subject of cost accounting generally resolves itself into a matter of guesswork.

In the case of a commercial concern whose energies are exclusively directed towards the execution of contracts, &c., much more accurate results can be arrived at.

Oncost charges may be divided for our purpose under three heads, plant, works oncost and administration oncost.

With regard to the plant, the usual practice with business concerns is to charge to the job the cost of plant which is specially purchased therefor or the value of existing plant, and to credit the cost account with the residual value at the conclusion of the work. With small tools a percentage basis, included in works oncost, is usually adopted.

The former practice is rarely applicable to municipalities which do not, as a rule, carry out works of great magnitude by direct labour. The plant they use is capable of being employed for successive jobs. It is consequently deemed to be more expedient to make the charge by means of a percentage.

TERMINAL COST ACCOUNTS FOR LOCAL AUTHORITIES

The rate must be based upon experience and should be calculated upon the value of labour employed, as plant and labour can be regarded as fairly correlative. Should special plant be purchased for a particular job, and its further utility be doubtful, the cost account should certainly be debited with a sufficient proportion of the cost. Again, special provision should be made for charging timber allowed to remain in the trench where its removal would be dangerous or otherwise not advisable.

A plant register should be kept to show the tools actually delivered to and returned from each job, the foreman being responsible for any shortage that might be revealed. Provision should also be made by means of transfer slips to record tools sent from one job to another without them having been passed through the store.

The rate per cent. can be tested from year to year by raising a memorandum plant account which would be debited with the value of the plant brought forward and with the purchases during the period, and credited with the percentage charges. The balance should represent the value of the plant on hand at the end of the year. It would be rare for this figure to agree with the value as arrived at by an actual inventory of the plant, and any material difference could be dealt with by adjusting the rate per cent. debited to the cost accounts during the year, or by writing it off to works oncost account. The former suggestion would probably not recommend itself as many cost accounts would have been closed during the year and the results reported to committees of the council.

Works Oncost

The charge for works oncost would be based on, *inter alia*, the following expenditure:—

- (1) Cost of supervision, e.g. salaries of engineer and outside staff;
- (2) Cost of the depot;
- (3) The use of plant where not separately dealt with.

As a general rule, the works oncost would be based on the cost of labour involved. The degree of supervision required would depend upon the labour employed rather than upon any other factor, and although in the case of sub-contracts a certain amount of supervision is necessary, it is submitted that more accurate results are obtainable by adopting the basis suggested than by calculating the percentage on the total cost of the work. This, however, is a matter upon which there may be some diversity of opinion.

With regard to the depot, it is quite true that there is little or no relationship between the depot and labour, but since the materials handled in the depot generally show a fairly constant ratio with the expenditure on labour, the depot charges are preferably dealt with on the above lines.

COST AND MANAGEMENT

An alternative method of bringing depot charges into account would be to add a percentage upon the amounts at which the stores issued are priced, to allow for handling, &c. This course is not recommended as the handling bears no relation to the value of the goods, but is dependent upon bulk, weight, &c., and to adopt this basis might yield an unfair result.

The inclusion of the depot charges in the works oncost based on labour seems to be justified on the ground that, taking one job with another, the materials supplied would be more or less of a uniformly composite character.

Administration Oncost

These charges would include all expenses both in the executive and finance departments directly concerned in the execution of the work performed and the administration in connection therewith, but excluding the salaries, &c., charged in works oncost. The basis of charge would be the total expenditure incurred in relation to the job. This would include expenditure on sub-contracts, for considerable time may be devoted to the preparation of specifications, plans, &c., which would to a large extent make up for the work which would ordinarily be involved if the subject matter of the sub-contract had been carried out by direct labour. Any credits to the job by way of returned stores should, of course, be brought in prior to the calculation of the oncost charges, but any credit in respect of old materials, e.g. sand removed from excavations which might have a definite value, should be excluded in making the oncost calculation, as the work involved is just the same whether old materials are available or not.

In arriving at the proper charge to be added for oncost, one of the difficulties referred to *supra* becomes apparent here, for, whereas in commercial concerns the allocation of overhead charges can be made with reasonable accuracy, in the case of municipalities, a large proportion of the work is purely administrative and the proportion of expenditure to be charged as oncost is not a matter of fact so much as a matter of estimate. This emphasises the desirability of the costing records being kept under the control of the finance department, whereby any temptation there might be to under-estimate the proportion to be allocated with a view to keeping down the apparent cost of the work is removed.

Co-ordination with the Financial Books

The accuracy of the cost accounts can be tested by means of total accounts in the impersonal ledger. It is found convenient to sectionalise these total accounts, one being raised in respect of each of the various classes of undertakings subject to the costing treatment, e.g. highways, private street works, sewers, &c.

The postings to these total accounts would be effected through the various subsidiary books utilised as previously described to feed the

TERMINAL COST ACCOUNTS FOR LOCAL AUTHORITIES

cost ledger. For example, the wages journal would be ruled with columns corresponding to the total accounts kept and for the other and ordinary services, and the posting can then be made in the customary manner.

With regard to goods received by and issued from store, the stores abstract will be taken as the basis of posting, and so on, so that there is virtually a duplicate system of posting, one to the total accounts in the general ledger, and the other to the cost accounts which are supplementary to the financial records.

The balances on these sectional total accounts should then equal the total of the balances on the group of cost accounts comprised within the particular section and each debit and credit on the total accounts would similarly agree with totals of the respective amounts as shown by the costing abstract. These would, of course, only relate to direct charges. Indirect charges would be brought in by debiting the total accounts with the totals of the amounts charged to the individual cost accounts and crediting the accounts relating to the various services concerned.

Cost Accounting System for a Journal Bearing Foundry

By J. ERNEST BEAUVAIS, C.G.A., A.C.I.S., Montreal

(A thesis submitted in connection with examination of The Canadian Society of Cost Accountants and Industrial Engineers).

Contents

Chapters

Introduction.

I —Information on Journal Bearings.

II —Manufacturing Processes.

1. Melting.
2. Moulding.
3. Fettling.
4. Lining.

COST AND MANAGEMENT

III—Actual Cost

- Process Cost System.
- Weighted Averages
- Elements of Cost
 - (a) Materials
 - (b) Wages.
 - (c) Manufacturing Expenses.
- The Cost Ledger.
- Posting to Cost Ledger.
- The General Ledger.
- Posting to General Ledger.

IV—Standard Cost

- Basic Rates.
- Accounting Procedure.
- Statement of Responsibility.

V —Budgetary Control

- Budget of Sales.
- Budget of Production.
- Budget of Selling, Adm. and Fin. Expenses.
- Budget of Expected Net Profits.
- Control of the Budgets.

Introduction

THE following thesis covers the description of a Cost Accounting System for the Journal Bearing Industry. It is divided into five main parts, namely:—

- (1) Information on Journal Bearings.
- (2) Manufacturing Processes.
- (3) Actual Cost.
- (4) Standard Cost.
- (5) Budgetary Control.

The reader is reminded that the maximum number of words allowed is ten thousand which has its influence in the omission of certain explanations, perhaps unimportant, but helpful in making the outline of a system of this nature clearer.

Chapter I

Information on Journal Bearings

The manufacturing of Journal Bearings constitute an important Canadian Industry, but for most Canadians they are not very familiar with it. Certain brief notes on it will, therefore, be found of interest at the outset.

A Journal Bearing is that concave bronze casting placed outside the wheels of locomotive tenders, passenger and freight equipment cars of our railways and under which rotates the ends of the axles or

COST ACCOUNTING SYSTEM, JOURNAL BEARING FOUNDRY

journals. These wheels do not rotate around the axles, as is usually seen on other mechanical constructions, but they are fixed to them. Therefore, both the wheels and the axles rotate at the same time and at the same speed.

Journal Bearings are composed of an alloy containing the following metals in the approximate proportions indicated:—

Copper	73%
Lead	20%
Tin	5%
Zinc	2%

Total 100%

The incurved surface of the Bearing, against which rides the journal is lined $\frac{1}{4}$ inch thick with a softer metal, called Babbitt. Its composition being approximately as follows:—

Lead	88%
Antimony	10%
Tin	2%

Total 100%

Due to the continuous friction of the Journal against the Bearing when a train is in motion, the Babbitt lining becomes highly heated, especially when there is a lack of lubricant, and wears out after a certain time necessitating the entire replacement of the Bearing.

The life of a Journal Bearing is very irregular and may vary from a few hours to several months depending upon the quality of fabrication, the quantity of lubricant used and the usage to which it has been put.

When the lining is worn out, the Bearing has to be completely remanufactured in order to obtain a first class product at all times. This is most essential; any serious defects might be the cause of grave accidents particularly when a train is running at high speed. For this reason a rigid inspection is given to each Journal Bearing and a test is made to ascertain the uniformity of the grain of the metal on one Bearing in each lot of three hundred, before they are shipped for service.

Chapter II

Manufacturing Processes

The manufacture of Journal Bearings comprises four main processes as follows:—

- 1.—Melting
- 2.—Moulding
- 3.—Fettling
- 4.—Lining.

COST AND MANAGEMENT

So that the reader may understand more fully the work which is carried on in the Foundry under study, a brief description of each process is now in order.

1.—Melting

The various metals composing the Journal Bearing Alloy are stored in individual bins.

The raw material is melted in rotating type, power operated and automatically controlled furnaces in which the heating medium is an electric arc produced by carbons or electrodes inserted at each end of the furnace. In them the alloy is brought up to a pouring temperature of 2150° Fahrenheit. The size of the melt used by the Foundry under consideration is 515 pounds and 35 minutes are required before it is ready for pouring.

2.—Moulding

This process consist in using metal patterns to make the sand moulds in flasks (or moulding boxes) in which the molten metal is poured. Machines are used for mould-making. By means of rapid vibration they pack the sand firmly and uniformly around the pattern and then automatically withdraw the pattern. Each mould is made in two parts or halves. The upper half is laid on top of the lower half and the metal poured in, to form the complete casting.

A system of tramrail is used to carry from the furnace room the ladles of molten metal for pouring at any point of the whole moulding floor. This system enables a pot to be adjusted to the exact pouring position required.

After the castings are poured they are allowed to cool. Then the moulds are broken up and the castings are removed in their rough state. Sand and scale still adhere to them.

The sand used for making moulds is imported from the United States and is used over and over again until it becomes too dirty.

3.—Fettling

The rough surface which the Journal Bearings have after they are shaken out of the mould sand is made smooth by the fettling process. This consists in cleaning and trimming the castings by the use of tumbling mills (also called rumblers) and grinders. The Journal Bearings are next put through the boring machine which scrapes the concave surface of the bearings and brings them to the thickness stated in the railway companies' specifications. This machine can bore four bearings at one time.

4.—Lining

At this stage of production, the bored surface of the Journal Bearings is dipped into a flux and thoroughly tinned. Then a babbitt metal lining is poured onto it. When this lining has been cast onto the bronze bearing, the excess metal is trimmed off. The whole treat-

COST ACCOUNTING SYSTEM, JOURNAL BEARING FOUNDRY

ment is made possible by the use of a special combination of apparatus. The finished products are then ready for inspection and must be accurate for measurements and composition to within very small tolerances before they are packed and shipped.

Chapter III Actual Cost

Process Cost System

Depending upon the type of railway car for which they are employed, Journal Bearings are produced in four distinct sizes, as follows:—

Class 1—4¼" x 8"	weighing approximately 13 pounds
" 2—5 " x 9"	" 20 "
" 3—5½" x 10"	" 25 "
" 4—6 " x 11"	" 37 "

As the composition and production of these different sized Bearings are similar in every respect, a Process Cost System suggests itself. Furthermore, the pound has been found to be the most logical Unit of Cost principally because Journal Bearings are sold on that basis.

Weighted Averages

However, because the various sizes of Journal Bearings do not bear a cost proportionate to their weights, due mainly to the fact that, with the exception of Class 4, all the other Classes carry practically the same wage cost per bearing although their weights are substantially different, the method of Weighted Averages is resorted to. Therefore, careful estimates of cost are made and revised when required by changing conditions, for each class of Bearing and these are reduced to simple proportions or points for use in apportioning the total cost of production over the four classes of Bearings. The following is given as an example:—

Class 1	=	103	points
" 2	=	54	"
" 3	=	38	"
" 4	=	36	"

The table of computation, Cost of Journal Bearings by Classes (Statement 1) below, shows how these points are used in the distribution of the total cost of production over the classes of Journal Bearings.

At the end of a period, when the total production (A) and its cost have been ascertained, the cost (D) is divided by the total value of the production in points (B) so as to obtain the average cost per point (C). Then the cost per pound for the whole production (F) and for each class of Journal Bearing (G, H, I, J) is arrived at in the following manner:

Statement 1
COST OF JOURNAL BEARINGS BY CLASSES

Quantity of Jnl. Bearings Manufactured	Points	Total Value of Production in Points	Cost Per Point	Total Cost Per Class	Weight of Production	Cost Per Pound
Class 1	x 103 =		C	=	-:-	G
" 2	x 54 =		C	=	-:-	H
" 3	x 38 =		C	=	-:-	I
" 4	x 36 =		C	=	-:-	J
A		B	C	D	E	F

If the cost per Bearing in each class is desired, it is obtained thus:

Class	Per Class	Manufactured	Jnl. Bearing
Class 1	:	=	
" 2	:	=	
" 3	:	=	
" 4	:	=	
	D	A	K

COST ACCOUNTING SYSTEM, JOURNAL BEARING FOUNDRY

Elements of Cost

An outline of the procedure established in order to gather the information necessary to compile and control the three elements of manufacturing cost, viz: Material, Wages and Manufacturing Expenses, follows.—

(a) Material

When materials of any kind are needed by a department, the foreman of the latter issues a Stores Requisition in duplicate (Form 1) to the Storekeeper. The Storekeeper then delivers the material to the department requiring it and a receipt is taken upon the copy of the Requisition. The receipted copy is held on file by the Storekeeper and serves as his authority for the material he has issued. The original copy is sent to the Purchasing Department where it is priced and forwarded to the Cost Office for computation and entry on the Summary of Materials Consumed (Form 2). The Stores Requisitions are numbered so that when they are filed in numerical order by the Cost Office any missing ones can be immediately noticed and located.

(TO BE CONTINUED IN MAY ISSUE)

Do You realize that poorly made Business Forms have an unfavorable influence on the efficiency of an organization.

The best accountants demand well made forms, for they know by their use errors are avoided and better work is done with less expense.

This will hold good throughout all departments of an organization.

We are Specialists in the manufacture of Business Forms and Stationery, and no other class of Printing is done by us. **THINK?**

BUSINESS SYSTEMS LIMITED
52 Spadina Ave.
TORONTO

Tel. Adel. 2621

COST CLERKS and COST ACCOUNTANTS

For more than thirty years we have been training men along Cost Accounting lines. The large number of our graduates who have risen to high executive positions prove the effectiveness of our plan.

You may have a copy of our catalogue by writing

W. G. CANNING

**International Accountants
Society Inc.
805 Central Bldg.
Toronto, Ont.**

COST AND MANAGEMENT

Original Copy for Cost Office
Duplicate " " Storekeeper

FORM 1

JOURNAL BEARING FOUNDRY CO.

STORES REQUISITION

	Req. No.	Date
--	---------------	------------

TO STOREKEEPER

Please deliver the following material to

Charge — Materials in Process

 " — Manufacturing Expense

Quantity	Unit	Size	Description	Unit Cost	Amount
----------	------	------	-------------	-----------	--------

APPROVED:

Foreman

FORM 2

JOURNAL BEARING FOUNDRY CO.

SUMMARY OF MATERIALS CONSUMED

MONTH OF 19...

CREDIT STORES		DEBITS	
Date	Requisition No.	Total	Amount
		Copper	Lead
		Tin	Zinc
		Babbitt	Misc
		Stores	Sand
		Coal	

Note: This column is analysed at the end of the period to obtain the debits to the various Material in Process and Manufacturing Expense Accounts.

CHAPTER NOTES

CHAPTER NOTES

MONTREAL

The fact that Montreal Chapter has not recently appeared under the heading "Chapter Notes" is not circumstantial evidence of inactivity. On the contrary, since this Chapter last went into print in "Cost and Management," all meetings proved to be both interesting and instructive.

November 28th

On November 28th, Col. Irving P. Rexford, a member of the Montreal Citizens' Committee, gave those present much food for thought concerning the appropriation of this City's revenue. He said, that sound municipal government pays big dividends, and Montreal as the largest city in Canada should be an example to other cities in the way of efficient and economical management. The cost of inefficient government are "unemployment, low wages and insecurity," and if the rank and file of citizens, whether real estate owners or not, realized that they are the ones who ultimately pay the price they might give the subject closer attention.

Col. Rexford, in a moderately worded plea for consistent study of municipal business and for the development of "sound leadership," outlined the history of civic finance in the past 20 years. When the administrative commission was appointed in 1917, the total funded debt was \$118,892,119 and the previous year's deficit nearly \$16,000,000. During the next four years the debt increase was "less than \$500,000," he declared, whereas within the first year after government by commission ended "a revenue deficit of \$849,225 appeared"—almost double the debt increase of the prior four years. Montreal's net debt in 1921 was \$113,254,710, but by 1935 it had become \$261,745,215. Compared with Toronto's debt increase of 50 per cent. during that period, Montreal's increase had been over 130 per cent., he said.

December 11th

On Dec. 11th our debaters, Messrs. R. E. Heartz and E. R. Maloney, did battle for us in our annual bout with our friends the General Accountants Association, and upheld the affirmative of the Resolution: "That Man will Benefit by a Continuing Increase in the Use of Machinery." Their victory over Messrs. G. Choquette and L. Hollingworth was indeed a thin one.

Messrs. J. W. Parkinson, J. D. Wilson and J. E. Beauvais, for the General Accountants Association, had their revenge when they won a comfortable victory by upholding the affirmative of the Resolution

COST AND MANAGEMENT

"That a Twelve-month Equal-quarter Calendar would be of Greater Value to Industry than Either the Present Calendar or the Proposed Thirteen-month Calendar." Messrs. D. J. B. Peddie, J. G. Renaud and D. R. Patton, for this Chapter, were unable, in the opinion of the Judges, Messrs. H. Whiston and H. Bertrand (G.A.A.) and Messrs. L. Belanger and R. R. Thompson (C.S.C.A.) to upset the arguments of the affirmative. This debate was on the Oregon System, and Mr. G. T. Bowden acted as Chairman.

January 15th

The second half of the Season's programme opened in hilarious style on January 15th with the Annual Smoker. This function consisted of a pie-eating contest in which the boys of the Griffintown Club entered with great gusto, some well-chosen and pithy stories by that popular mimic Mr. "Canny" Grant, Spanish Dances and Scotch Dances, popular songs rendered in an alluring voice, and an acrobatic feat in which the performer passed herself through a twelve-inch hoop—very gracefully too—while balancing a glass of Coco-Cola on her forehead.

It was an evening which, in the annals of this Chapter's entertainments, stands out by itself, and which has confirmed in the minds of those who were present the ability and resourcefulness of the organizer Mr. T. I. Smyth. The enjoyment of the evening was in no small way enhanced by the presence of a representative number of members of the General Accountants Association.

REFERENCE LITERATURE

RECEIVED IN MARCH

Centralograph, Controlling Machine Time by the. The Accountant, February 13.

Inventory Control, Retail Method of. The Canadian Chartered Accountant, March.

Cost Accounting Opportunities Under the Robinson-Patman Act. National Association of Cost Accountants, February 15.

Inventory Valuation, Problems of Present-day. National Association of Cost Accountants, March 1.

Cost Accounting, Some Observations on. The Australian Accountant, January.

Price Discrimination and Cost. The Journal of Accountancy, March.

Depreciation in Financial Statements. The Journal of Accountancy, March.

Stores Organization with Special Reference to Purchasing. The Indian Accountant, December.

